APPENDIX III

Code Official Tear-Outs

The following tear-out sheets, contained in this chapter's addendum, may help in explaining some energy-efficient design techniques to code officials unaware of them. Each topic "sheet" is designed to stand alone and includes a description of the technique and why it is useful, a discussion of the relevant code sections that permit the technique, and guidance on what the official should look for in plan reviews and inspections.

- Single Top Plates
- No Header in Non-Bearing Walls
- Floor Joists Spaced at 24" O.C.
- Studs Spaced at 24" O.C.
- Open Spaces as Return-Air Options
- Details for Mechanically-Vented Crawl Spaces
- Ventilation Requirements for Condensing Clothes Dryers
- Drywall Clips
- Rigid Board Insulation Installed as Draft Stop in Attic Kneewall

Single Top Plates

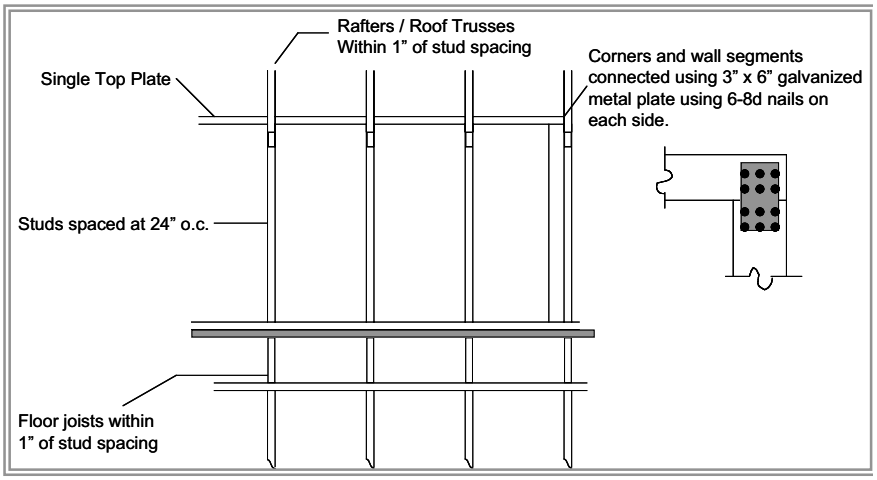
Issue

Standard practice for exterior and interior wall framing is to use a double top plate to connect wall segments and to support framing above the plates. A single top plate is allowed under the International Residential Code but is an uncommon construction practice.

Background / Description

Eliminating unnecessary wood framing within walls can increase the thermal efficiency of the wall system. Less framing allows more insulation to be installed and also eliminates hot and cold spots within the wall system. Eliminating wood framing can also reduce drywall cracking caused by the movement of wood within the walls. Using a single top plate, instead of a traditional double top plate, is allowed by code in some wood frame walls.

The single top plates must be adequately tied at joints, corners and intersecting walls by at least a 3” x 6” - 0.036-inch thick galvanized steel plate that is nailed to each wall or wall segment by six 8d nails on each side. Rafters or joists must be within 1 inch of center over the studs. The top plate may be omitted over lintels that are adequately tied to adjacent wall sections with steel plates.



Interior nonbearing walls may be 2” x 3” inch studs spaced 24 inches (610 mm) on center or, if not part of a braced wall line, 2” x 4” inch flat studs 16 inches on center. Interior nonbearing walls must be capped with at least a single top plate and fireblocked.

Plan Review / Inspection Guidance:

Plan Review

1. Verify that the wall framing details call out a single top plate and also specify the 3” x 6” – 0.036-inch thick galvanized steel plate to be installed

at each corner and wall segment. Also verify the nailing required under IRC Section 602.3.2, Exception is specified on the building plans.

2. Verify that the spacing for the roof framing is identical to that of the wall framing. For example the roof framing must be spaced at 24" on center if the wall framing is also spaced at 24" on center. The rafter / roof trusses must be within 1" of being directly above the wall studs.
3. If the wall system supports a floor, verify that the wall floor joist spacing is identical to the wall stud spacing.

Field Inspection

1. Verify that the top plate is fastened to the studs per IRC Table R602.3(1).
2. Verify that a 3" x 6" – 0.036-inch thick galvanized steel plate is installed at each corner and wall segment and that six 8d nails are used to attach each side of the plate to the corner or wall segment.
3. Verify that the rafters or trusses used in the roof framing are within one inch of the center of each of the studs below.
4. Verify that the floor joists supported by the studs are within one inch of the center of the studs below.

Code Citations

IRC 2000 and 2003, in section R602.3.2 Top Plate

Exception: A single top plate may be installed in stud walls, provided the plate is adequately tied at joints, corners and intersecting walls by a minimum 3-inch-by-6-inch by a 0.036-inch-thick (76 mm by 152 mm by 0.914 mm) galvanized steel plate that is nailed to each wall or segment of wall by six 8d nails on each side, provided the rafters or joists are centered over the studs with a tolerance of no more than 1 inch (25.4 mm). The top plate may be omitted over lintels that are adequately tied to adjacent wall sections with steel plates or equivalent as previously described.

IRC 2000 and 2003, in **Figure 602.3(2)**

The figure label states "*single or double top plate*".

IRC 2000 and 2003, in **section R602.5 Interior Nonbearing Walls**

Interior nonbearing walls shall be permitted to be constructed with 2-inch-by-3-inch (51 mm by 76 mm) studs spaced 24 inches (610 mm) on center or, when not part of a braced wall line, 2-inch-by-4-inc h (51 mm by 102 mm) flat studs spaced at 16 inches (406 mm) on center. Interior nonbearing walls shall be capped with at least a single top plate. Interior nonbearing walls shall be fireblocked in accordance with Section R602.8.

No Headers in Nonbearing Walls

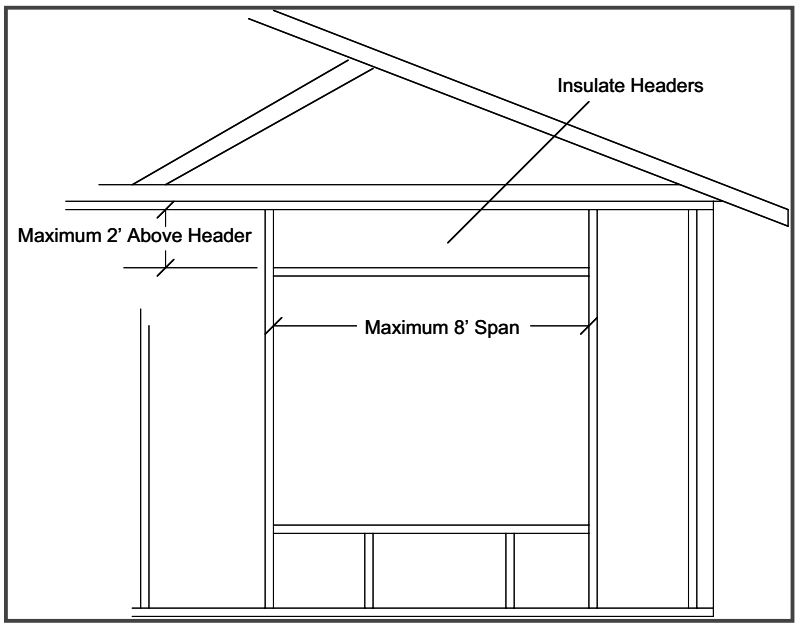
Issue

The use of header stock over windows and doors in nonbearing walls is typical construction practice throughout the industry. But a single 2” x 4” is allowed to be used as a header in nonload bearing wall systems. This practice is unfamiliar to many in the enforcement and building industry.

Background / Description

Eliminating unnecessary wood framing within walls can increase the energy efficiency of the wall. Less framing allows more insulation to be installed and also eliminates hot and cold spots within the wall. Eliminating wood framing can also reduce drywall cracking caused by the movement of wood within the walls.

A single flat 2x4 may be used as a header in exterior, or interior, non-load bearing walls. The maximum opening may not exceed 8 feet. The vertical distance to the parallel surface above must be not more than 24 inches. No cripples or blocking are required above the header. On exterior walls, cavities above the headers must be insulated.


Insulate Headers
Maximum 2' Above Header
Maximum 8' Span

Plan Review / Inspection Guidance

Plan Review

1. Verify that the framing details call out no headers only for non-bearing interior or exterior walls.
2. Verify the horizontal span for each rough window and door opening is no greater than 8 feet.
3. Verify that the header height between the header and the next parallel framing member above the header is not greater than 2 feet. The next vertical parallel framing member will typically be the top plate.

Field Inspection

Framing Inspection:

1. Verify that the horizontal rough opening framed out in the wall assembly matches, or is less than, that called out on the approved building plans.
2. Verify that the distance between the header and the next parallel framing member (typically the top plate) is no greater than 24 inches.

Insulation Inspection

Verify that the framing cavity above the header is insulated to the required insulation R-value called out on the approved plans or documentation.

Code Citations

IRC 2000 and 2003, Section 602.7.2

Nonbearing walls. Load-bearing headers are not required in interior or exterior nonbearing walls. A single flat 2-inch-by-4-inch (51 mm by 102 mm) member may be used as a header in interior or exterior nonbearing walls for openings up to 8 feet (2438 mm) in width if the vertical distance to the parallel nailing surface above is not more than 24 inches (610 mm). For such nonbearing headers, no cripples or blocking are required above the header.

IRC 2000 and 2003 Table R702.3.5 Minimum Thickness & Application of Gypsum Board

Allows the use of 24" on center framing for fastening gypsum board with either fasters or adhesive _" thickness or greater.

IRC 2000 and 2003 Section R703 Exterior Covering

Structural sheathing and siding requirements are based on Table R703.4. Note that footnote “a” specifies that the table is based on 16” o.c. and that studs spaced 24”o.c. siding shall be applied to sheathing approved for that spacing.

Header Hangers in Bearing Walls

Issue

Headers for windows and doors are typically supported by cripples or jack studs. These studs can be eliminated using header hangers, as allowed under the International Residential Code.

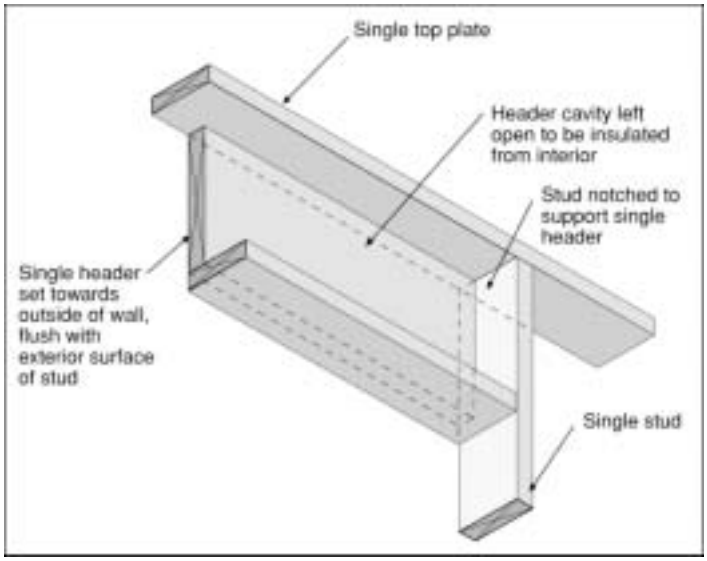
Background / Description

Eliminating unnecessary wood framing within walls can increase the thermal efficiency of the wall system. Less framing allows more insulation to be installed and also eliminates hot and cold spots within the wall system. Eliminating wood framing can also reduce drywall cracking caused by the movement of wood within the walls.

Jack studs or trimmers that support headers around windows can be eliminated through the use of an approved framing anchor ("header hanger") attached to the full-height wall stud and to the header (see Figure). 2000 IRC Table R502.5(1), Footnote "d" allows for the use of header hangers based on the following parameters:

- Ground Snow Load
- Building Width
- Number of Floors and Roof assemblies supported
- Size of the header material
- Span of the header

Wood structural panel box headers are limited to a span of no greater than 4 feet if using a header hanger.



Plan Review / Inspection Guidance

Plan Review

1. Verify the number of floors and/or roof ceiling assemblies that is being supported by the header per Table R502.5(1).
2. Verify that the building width perpendicular to the ridge is not greater than that shown in Table R502.5(1).
3. Verify that the span of each window opening, where a header hanger is proposed, is not greater than the value shown in Table R502.5(1).
4. Verify that the proposed header hanger to be used in the project has an ICC Evaluation Services report.

Field Inspection

1. Verify that the span of the opening is not greater than that shown on the building plans.
2. Verify that the header material is #2 grade lumber or better.
3. Verify that the header hanger is properly nailed per the manufacturer's instructions.

Code Citations

IRC 2000 and 2003, Table R502.5(1) Girder Spans and Header Spans for Exterior Bearing Walls Footnote “d”

d. *NJ – Number of jack studs required to support each end. Where the number of required jack studs equals one, the header are permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.*

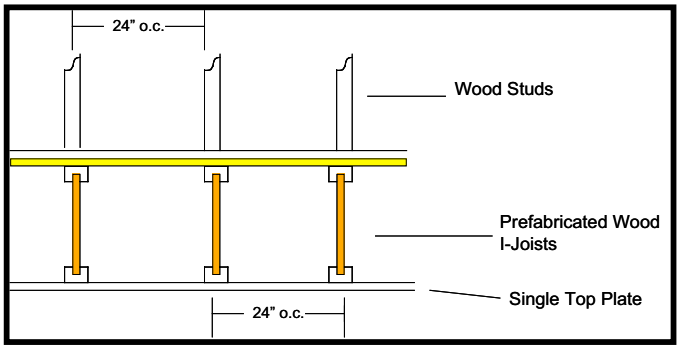
Floor Joists Spaced at 24” O.C.

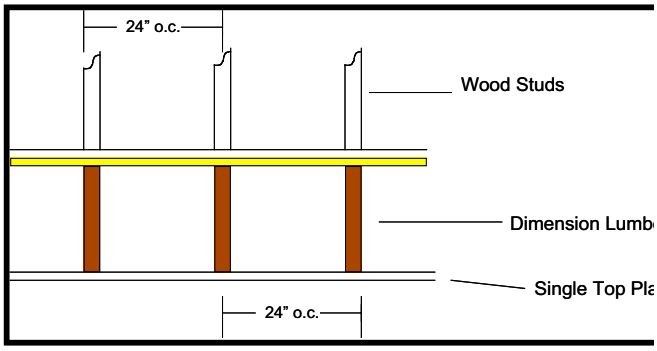
Issue

Floor joists must be spaced at 24” on center if used as part of an advanced framing strategy where the wall assemblies us a single top plate. This will allow the load to be transferred directly to the studs or foundation below.

Background / Description

Floor joists must be spaced at 24 inches on center if load bearing wood studs are spaced at 24 inches on center and a single top plate is used for the wall system.





Plan Review / Inspection Guidance

Plan Review

1. If dimensional lumber is used for the floor joists, verify that the floor joist spans are consistent with Table R502.3.1(1) for 24” on center spacing for the following:
    - Dead Load,
    - Maximum floor joist span,
    - Dimension of lumber, and
    - Specie and grade of lumber

2. If prefabricated wood I-joists are used for the floor joist, verify that the floor joist spacing is consistent with the manufacturer's specifications for the following:
    - Dead load
    - Maximum floor joist span

3. Verify that the floor sheathing selected for the subfloor conforms to the requirements per Table R503.1, R503.2.1.1(1) or R503.2.1.1(2).

Field Inspection

1. *Verify that the floor joists are consistent with the floor joists called out on the approved building plans.*
2. Verify that the subfloor installed on site is consistent with the subfloor type and thickness called for on the building plans.

Code Citations

IRC 2000 and 2003, Section R602.3.3 Bearing Studs

Where joists, trusses or rafters are spaced more than 16 inches on center and the bearing studs below are space 24 inches on center, such members shall bear within 5 inches of the studs beneath.

IRC 2000 and 2003, Section 502.3 Allowable Joist Spans

2000 and 2003 IRC Table R502.3.1(1) Floor Joist Spans for Common Lumber Species (Residential sleeping areas)

2000 and 2003 IRC Table R502.3.1(2) Floor Joist Spans for Common Lumber Species (Residential living areas)

For other grades and species and for other loading conditions, refer to AF&PA span Tables for Joists and Rafters.

IRC 2000 and 2003, Section R502.3.1 Sleeping Areas and Attic Joists

Table R502.3.1(1) shall be utilized to determine the maximum allowable span of floor joists that support sleeping areas and attics that are accessed by means of a fixed stairway provided that the live load does not exceed 30 psf and the design dead load does not exceed 10psf. The allowable span for ceiling joists that support attics utilized for limited storage or no storage shall be determined in accordance with Section R802.4.

IRC 2000 and 2003, Section R502.3.2 Other floor joists

Table R502.3.1(2) shall be utilized to determine the maximum allowable span of floor joists that support all areas of the building, other than sleeping and attics, provided that the design live load does not exceed 40 psf and the design dead does not exceed 10 psf.

IRC 2000 and 2003, Section **R602.3.2 Top Plate**

Exception: A single top plate may be installed in stud walls, provided the plate is adequately tied at joints, corners and intersecting walls by a minimum 3-inch-by-6-inch by a 0.036-inch-thick (76 mm by 152 mm by 0.914 mm) galvanized steel plate that is nailed to each wall or segment of wall by six 8d nails on each side, provided the rafters or joists are centered over the studs with a tolerance of no more than 1 inch (25.4 mm). The top plate may be omitted over lintels that are adequately tied to adjacent wall sections with steel plates or equivalent as previously described.

Studs Spaced at 24” o.c.

Issue

Walls are typically framed using framing spaced at 16” on center. Framing spacing can be moved to 24” on center, as allowed by the International Residential Code and the jurisdiction.

Background/Description

Eliminating unnecessary wood framing within walls can increase the thermal efficiency of the wall system. Less framing allows more insulation to be installed and also eliminates hot and cold spots within the wall system. Eliminating wood framing can also reduce drywall cracking caused by the movement of wood within the walls.

Spacing stud framing at 24 inches on center verses 16 inches on center reduces the number of framing members in exterior wall systems. This will allow more insulation to be placed in the wall system compared to standard 16 inch on center construction.

The 2000 and 2003 IRC allow for 2 x 4 and 2 x 6 studs to be spaced at 24 inches on center under certain circumstances (see Code References Allowing This Installation).

Plan Review / Inspection Guidance

Plan Review

1. Verify the stud size, spacing and height ($\leq$10 ft) is consistent with the maximum stud spacing in Table R602.3(5) for bearing walls. Verify that the stud grade called out on the plans is No. 3, standard or stud grade lumber.
2. Verify that stud size, spacing and height (> 10ft) is consistent with Table R602.3.1. Verify that the framing design in Seismic Category D meets the requirements of footnote “a”, “b” and “c” of Table R602.3(5). Verify that the stud grade called out on the plans in Seismic Category D is consistent with footnote “c”.

3. Verify that sheathing is called out on plans and is consistent with footnote “j” of Table R703.4 for 24” stud spacing.

Field Inspection

1. Compare the stud grade with what is called out on the framing details on the approved building plans for studs ≤ 10ft and studs > 10ft.
2. Verify that the sheathing type and thickness installed on site is consistent with that called out on the approved building plans.

Code Citations

IRC 2000, Section R602.3.1

In bearing walls, studs that are not more than 10 feet in length shall be spaced not more than is specified in Table R602.3(5). In bearing walls, studs that are more than 10 feet in height shall be spaced not more than specified in Table R602.3.1.

IRC 2003, Section R602.3.1.

The size, height and spacing of studs shall be in accordance with Table R602.3(5).

IRC 2000 and 2003, Table R602.3.1

Stud Spacing Based on Length of Wood in Seismic Design Categories A, B, C and D Exposed to Wind

2 x 4 framing between >10 feet and less than 12 feet in length can support up a roof only if spaced at 24 inches on center.

2 x 6 framing can support two floors and a roof up to a length of 14 feet spaced at 24 inches on center without a design required.

IRC 2000 and 2003, Table R703.4 Weather-Resistant Siding Attachment and Minimum Thickness

Provides requirements by sheathing and siding material for framing spaced 24 inches on center.

Open Spaces as Return-Air Options

Issue

Stud cavities and floor joist spaces are often used to return air to the HVAC system's air-handler, and are specifically allowed in the I-codes. Field testing shows that these return systems are often extremely leaky. Leaks within areas that include combustion appliances break the code and present potential health risks. Open spaces in the building are often effective and inexpensive; for example, incorporating hallways as a part of a return-air system.

Background / Description

Homes with basements often use wall stud and floor joist spaces as return-air cavities. Extensive testing indicates that duct leakage in these homes is very high unless ducts have been pressure tested and sealed under some beyond code program (utility, state or local) that tests for duct tightness. In one random sample of 40 homes during 2000, over 60% of the leaks were located in the return-air ducts. In one-third of those homes, return-air leaks connected to the basement could create enough negative pressure that exhaust gases were at risk of being back-drafted down water heater flues.

Some jurisdictions want every bedroom have a return-air duct directly back to the HVAC cabinet. Yet field measurements in typical homes indicate that second-floor return-air ducts relying on building cavities for air transport are often so leaky that they returned little air to the HVAC blower. By code building cavities used for return air can only convey air from one floor level back to the HVAC blower (2000 and 2003 IRC M1601.1.1 #7).

As an inexpensive and effective alternative to seal ducts, the code specifically allows return air by "connecting rooms by permanent openings." For example, hallways can be part of the return air path.

Two generic approaches are identified that fit the code.

Strategy #1, for single-story and multi-story homes:

1. Use either hard ducts or flex ducts for short, centralized returns that only pull air from central hallways and living zones. (Flex ducts are easy to seal tightly but are also vulnerable to flow restrictions.)
2. Any of the following is acceptable for pressure relief in bedrooms and dens with operable doors:
    a. A pair of offset transfer-air grilles in room walls that connect to hallways or other open spaces directly linked to the central return.
    b. Short "jump ducts" (typically located in ceilings) that allow room air to flow back to hallways.
    c. Any method of pressure balancing that, during operation of the HVAC blower, creates no more than a 2.5-pascal pressure difference across closed doors (amendment to the Florida code in 2003). This may require a pressure test.

Strategy #2, more suitable for ranches:

One HVAC ductwork concept incorporates a dropped ceiling. In a hallway ceiling that has already been finished with drywall, ductwork and under-framing is installed to create a long dropped ceiling, typically providing a 7-foot ceiling height the length of the hallway. The supply plenum and mini-runs are suspended within the cavity; the rest of the dropped ceiling cavity carries return air from individual rooms back to the HVAC air-handler. (For more details, see "For More Information.")

Plan Review / Inspection Guidance

The plan review guidance for *Strategy #1* assumes that mechanical plans have been submitted for permit. If no mechanical plan is submitted compliance will need to be determined in the field.

1. Verify that the mechanical plan shows the location of the return and supply duct system and the proposed cfm for each register.
2. Verify that the location of the jump ducts, offset transfer grills or pressure balancing strategy is shown on the plan.

3. Verify that the total unobstructed area for each transfer grille is specified on the plans. The grille area should be based on the total supply cfm for the room.
4. Verify that the return duct(s) back to the system is sized per manufacturers specification. Verify that the return duct locations are in centralized hallways or living zones and not in a closet, bathroom, toilet room, kitchen, garage, mechanical room, furnace room, other dwelling unit, or a room containing a fuel burning appliance that draws its air from that exhausts air into that room..(IRC 2000 and 20003 Section M1602.3).
5. Require a construction detail to show the proposed jump ducts, offset transfer grills or pressure balancing strategy.

Plan Review for *Strategy #2* assumes that mechanical plans have been submitted for permit. If no mechanical plan is submitted compliance will need to be determined in the field.

1. Verify that a mechanical plan has been submitted that shows the location of the return and supply duct system and that proposed cfm for each register.
2. Verify that the total unobstructed area for each transfer grille is specified on the plans. The grille area should be based on the total supply cfm for the room.
3. Require a construction detail to show the dropped ceiling detail and how the supply duct will be suspended and supported in the dropped ceiling space.

Field Inspection

1. If mechanical plans have been submitted verify that that the installed system matches the system shown on the approved building plans.
2. If mechanical plans have not been submitted verify the following in the field:
    a. For Strategy #1, verify that a transfer grill or jump duct is installed for each sleeping room. Also, verify that centralized returns are located in a hallway or living space.
    b. For jump ducts verify that the duct work is sealed.
    c. For Strategy #2, verify that the dropped ceiling space was framed after the sheetrock was installed and taped in the hallway. Also, verify that the sheetrock that forms the sides of the dropped return air cavity is sealed to the top plate.
    d. Verify that the supply duct is properly sealed and supported per IRC Section M1601.3.

Code Citations

IRC 2003, Section M1601 Duct Construction, M1601.1.1 Above Ground Duct Systems

Item #7

Stud wall cavities and the spaces between solid floor joists to be utilized as air plenums shall comply with the following conditions:

7.3 Stud wall cavities shall not convey air from more than one floor level.

7.4 Stud wall cavities and joist space plenums shall be isolated from adjacent concealed spaces by tight-fitting fire blocking in accordance with Section R602.8

IRC 2000 and 2003, Section M1601.3.1

Joints of duct systems shall be made substantially airtight by means of tapes, mastics, gasketing or other approved closure systems…

IRC 2000 and 2003, Section M1602.2 Prohibited Sources

Prohibited sources, allows for permanent openings between rooms in order to connect spaces together to meet a return-air location requirement:

Item 4 prohibits return air sources as follows "*A closet, bathroom, toilet room, kitchen, garage, mechanical room, furnace room or other dwelling unit"* Item 5 prohibits "*A room or space containing a fuel-burning appliance where such a room serves as the sole source of return air*.".

For more information:

--Builder's Guide: Cold Climates, Joe Lstiburek (Energy & Environmental Building Association, 2001) p. 179; available from www.eeba.org

--"Design and Construction of Interior Duct Systems," Florida Solar Energy Center (FSEC-PF-365-01), www.fsec.ucf.edu

Details for Mechanically-Vented Crawl Spaces

Issue

Codes allow conditioned crawl spaces with mechanical ventilation instead of crawl spaces with passive vents to the outdoors. However, code officials and builders are often uncertain about the design details.

Background / Description

Traditional crawl space designs include passive foundation-wall vents that are supposed to let moisture and contaminants escape outside. Yet field research shows that venting may make these potential problems worse. Eliminating crawl space vents and drawing house air in to condition the crawl space reduces moisture problems and can increase energy efficiency.

The IRC specifically allows crawl space designs with an exhaust ventilation system instead of fixed ventilation openings through the foundation walls. To comply, a mechanically-vented crawl space design must have a continuously sealed ground cover, no fixed ventilation openings to the outdoors, and must be supplied with a continuously operating exhaust fan.

Sizing the fan. *Two design options:*

A. Size to the code minimum: Eliminate the foundation vents when continuously operated mechanical ventilation is provided at a rate of 1.0 cfm for each 50 square feet of under-floor space (e.g., 20 cfm per 1000 ft^2) (Section R408.2, Exception 4).

B. Size to crawl-space volume: Size for one air-change per hour--the assumed ventilation rate for crawl spaces with passive vents in foundation walls. For example, a 1000 ft^2 crawl space with 3.5 feet between ground and floor deck, a fan should exhaust 58 cfm.

***Type of fan*:** Code does not specify details about fans used in crawl spaces. One possibility is to follow the Colorado amendments to the IRC. Require a fan rated for 44,000 hours (5 years) of continuous operation with flex connections or other installation detailing to reduce vibration and noise associated with the fan. The fan must be connected to a trouble light or an alarm to signal occupants when the fan fails.

Supply air for the exhaust fan: Transfer-air openings, one per 250 ft^2 of crawl space floor area, are installed in the decking between the crawl space and conditioned rooms above. A continuously operating exhaust fan pulls house air down through these openings. Airflow through the transfer openings is restricted (e.g., through a capped "boot" that has holes drilled in the cap) per Table.

Amount of air required	Minimum hole size	Maximum hole size
0 – 10 CFM	1.5 in^2 min.	2.4 in^2 max.
11-15 CFM	2.4 in^2 min.	3.6 in^2 max.
16 – 20 CFM	3.6 in^2 min.	4.4 in^2 max.

***Pressure balance*:** the crawl-space exhaust fan, typically 30-60 cfm, will exert slight negative pressure on the house above. The resulting negative pressure will roughly equal that from a bathroom fan, but will be considerably less than the pressure generated by dryers and kitchen exhaust fans. The recommended design specification: when all exhaust appliances and any forced-air HVAC system operate simultaneously, any zone with an atmospherically-vented gas appliance should experience less than 3 pascals of negative pressure.

Plan Review / Inspection Guidance:

1. *Removal of debris*: the under-floor grade is clean of all construction materials, vegetation and (non-soil) organic material (2000 and 2003 IRC R408.4).
2. *Crawl space wall insulation*: installed in accordance with the IECC or IRC specifications.
3. *Ground cover*: "continuous vapor retarder" would be sheet material with less than 1.0 permeance (e.g., polyethylene film) that is sealed at joints as well as to the foundation wall plus to all piers and other penetrations; or a concrete slab.
4. *Fan, when using Exception 4*: sized to provide a minimum of 1 cfm per 50 ft^2 of under-floor space.
5. *Supply-air pathways*: Look for pathways allowing house air to be drawn, under slight negative pressure, into the crawl space (e.g., one transfer-air grille per 250 ft^2 of crawl space floor area). Calculations should specify transfer air sizing.

Code Citations

IRC 2000 and 2003, Section R408 Under-Floor Space

R408.1 Ventilation. The under-floor space…shall be provided with ventilation openings through foundation walls or exterior walls.
Exceptions: #4. Ventilation openings are not required where continuously operated mechanical ventilation is provided at a rate of 1.0 cfm (1.02 L/s) for each 50 square feet

(10m^3) of under-floor space floor area and ground surface is covered with an approved vapor retarder material.

IMC 2000 and 2003, Section 403 Mechanical Ventilation

403.1 Ventilation system. …The system shall not be prohibited from producing negative or positive pressure.

For additional information:

--"The Case for Conditioned, Unvented Crawl Spaces," Peter Yost and Ann Edminster, Building Safety Journal, May 2003

--"Recommended Moisture Control Amendments to the IRC," Colorado ICC Chapter (Sept 2003 draft); and "Guidelines for Design and Construction of New Homes with Below-Grade Underfloor Spaces," Moisture Management Task Force, September 2003 draft (www.e-star.com)

Ventilation Requirements for Condensing Clothes Dryers

Issue

Conventional dryers require ductwork to exhaust water vapor from the appliance during operation. That exhaust can contribute to negative pressure in the home, depending on location. Some condensing dryers, relatively new products to the U.S. marketplace, don't require any ducted exhaust.

Background / Description

A fully-loaded conventional clothes dryer exhausts several pounds of water, in its vapor form, during a typical drying cycle. That water vapor is exhausted to the outdoors.

By contrast, some condensing dryers are designed to condense that water into liquid. These tend to increase energy efficiency. Some dryers draw in room air to cool the interior air and condense the water into a condensate holder. Some appliances use small blowers to circulate air across a heat-exchanger inside the dryer. Others use an internal water-cooling system to condense the water vapor. Whatever the design particular, the condensate is either pumped away to the drain or is emptied by hand at the end of the drying cycle. Some condensing dryers are actually combo washer/dryer appliances. Common in Europe for years, these appliances are becoming more widely used in the U.S.

Condensing dryers can be useful in situations where the laundry room is located a significant distance from an exterior wall that it can vent to, thereby avoiding a long dryer vent run and possible moisture condensation problems on that run.

Plan Review / Inspection Guidance

Plan Review

Verify that the building plans specify a condensing (ductless) dryer or ventless combo washer/dryer to be installed.

Verify that the proper drainage has been shown on the plumbing plans for condensing dryers using a pump to remove condensate from the dryer.

Field Inspection

Framing inspection

Verify that the proper drainage has been provided for the condensing dryer if a pump is used to remove the condensate.

Verify that the drainage that is provided is per manufacturers specifications.

Code Citations

IRC 2003, Section M1501 Clothes Dryer Exhaust

M1501.1 General. Dryer exhaust systems shall be independent of all other systems, shall convey the moisture to the outdoors and shall terminate on the outside of the building.

Exception: This section shall not apply to listed and labeled condensing (ductless) clothes dryers.

IRC 2003 Section P3001 – General.

The provisions of this chapter shall govern the materials, design, construction and installation of sanitary draining systems. Plumbing materials shall conform to the requirements of this chapter. The drainage waste and vent (DWV) system shall consist of all piping for conveying wastes from plumbing fixtures, appliances and appurtenances, including fixture traps; above grade drainage piping; below- grade drains within the building (building drain); below-and above-grade venting systems; and piping to the public sewer or private septic system.

IMC 2003, Section 504 Clothes Dryer Exhaust, Section 504.1 Installation

Clothes dryers shall be exhausted in accordance with the manufacturer's instructions.
Exception: This section shall not apply to listed and labeled condensing (ductless) clothes dryers.

For additional information:
--Web search under "condensing clothes dryers" will generate product lists and detailed product-specific functional descriptions and product specifications.

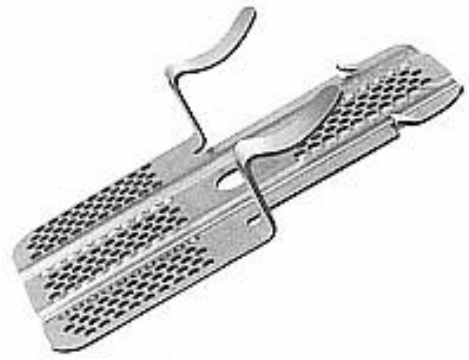
Drywall Clips

Issue

Many jurisdictions are not familiar with using drywall clips for wall gypboard.

Background / Description

Metal or plastic drywall clips can be used to replace a third stud at a corner, at a partition intersection backing stud, or in the ceiling to replace a nailer. The reduced attachment (wood to drywall) resulting from the use of dry wall clips allows small movements without drywall cracking and nail pops. Small movements are normal as wood responds to changes in temperature and moisture content over time.



Plan Review / Inspection Guidance

Nails and screws are not used with drywall clips.

Two-stud corners and drywall clips are often used in combination with airtight drywall, where the drywall and well-sealed gypboard seams provide an effective interior air barrier**.**

Code Citations

IRC 2000 and 2003, Section R602.3 Design and Construction

Exterior walls of wood-frame construction shall be designed and constructed in accordance with the provisions of this chapter and Figures R602.3(1) and R602.3(2) or in accordance with AF&PA's NDS. Components of exterior walls shall be fastened in accordance with Table R602.3(1) through R602.3(4).

IRC 2000 and 2003, Figure R602.3(2)

Note: A third stud and/or partition intersection backing studs shall be permitted to be omitted through the use of wood back-up cleats, metal drywall clips or other approved devices that will serve as adequate backing for the facing materials.

Rigid Board Insulation Installed as Draft Stop in Attic Kneewall

Issue

Rigid board insulation (foam plastic) is an effective draft stop and also increases the R-value of the attic kneewall if installed on the attic side of the kneewall, replacing the need for separate draft stop and insulation products. The IRC requires foam plastic insulation to be protected against ignition by using fiberglass batt insulation, gypsum board or other products that meet the flame and smoke density requirements. Foam plastic products rated for flame and smoke density can be installed without such a protective covering.

Background / Description

Insulating attic kneewalls between a conditioned space with vaulted ceilings and the attic is important to reduce energy loss through the wall, especially in the summer months. To be effective, the insulation installed in the kneewalls must be supported so that it stays in contact with the gypsum board, and protected against air moving through the insulation.

Foam plastic insulation can be installed on the attic side of the attic kneewall (see Figure) to both act as a draft stop between the conditioned house and the unconditioned attic and to increase the insulation R-value of the attic kneewall. Installing such an insulating backing in the kneewall supports the fiberglass batt insulation between framing members, replaces an air barrier, and adds insulating value to the attic kneewall.

Plan Review / Inspection Guidance

Plan Review:

1. Verify that plastic insulation called out on the construction detail meets the ASTM E 84 requirements for flame spread and smoke development. Require manufacturer's literature or an *ICC* Evaluation Service report.
2. Verify that the insulation R-value of the foam plastic insulation called out on the building plans meets or exceeds the R-value requirements called for on the energy code compliance documentation (only if credit has been taken for the foam plastic insulation).

Field Inspection:

1. Verify that the foam plastic insulation installed in the field is consistent with that called out on the building plans.
2. Verify that the insulation R-value specified on the insulation meets or exceeds the R-value called out on the plans or documentation.
3. Verify that that sealant has been installed around the edges of the insulation and that any holes or penetrations in the foam plastic insulation are sealed.

Code Citations

IRC 2000, Section R318.2.3 and IRC 2003, Section R314.2.3

Within attics and crawlspaces, where entry is made only for service of utilities, foam plastics shall be protected against ignition buy 1 _-inch-thick (38 mm) mineral fiber insulation, _-inch-thick (6.4 mm) wood structural panels, 3/8-inch (9.5 mm) particleboard,

_-inch (6.4 mm) hardboard, 3/8-inch (9.5 mm) gypsum board, or corrosion resistant steel having a base metal thickness of 0.016 inch (0.406 mm).

IRC 2000, Section R318.3

Plastic foam not meeting the requirements of Section R318.1 and R318.2 may be specifically approved on the basis of one of the following approved tests:
ASTM E 84, FM 4880, UL 1040, ASTM E152, or UL 1715, or fire tests related to actual end-use configurations. The specific approval may be based on the end use, quantity, location and similar considerations where such tests would not be applicable or practical.

IRC 2003, Section R314.3

Plastic foam not meeting the requirements of Section R318.1 and R318.2 may be specifically approved on the basis of one of the following approved tests:
ASTM E 84, FM 4880, UL 1040, NFPA 286, ASTM E152, or UL 1715, or fire tests related to actual end-use configurations. The specific approval may be based on the end use, quantity, location and similar considerations where such tests would not be applicable or practical.

Applicable Material Testing References

ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials

UL 1715 – Fire Test of Interior Finish Material.

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